Course Number

Instructor

Date

Section 11.5 The Area Problem

Objective: In this lesson you learned how to find limits of summations and use them to find areas of regions bounded by graphs of functions.

I. Limits of Summations (Pages 820–822)

What you should learn
How to find limits of summations

The following summation formulas and properties are used to evaluate finite and infinite summations.

1. $\sum_{i=1}^{n} c =$ _____
2. $\sum_{i=1}^{n} i =$ _____
3. $\sum_{i=1}^{n} i^2 =$ _____
4. $\sum_{i=1}^{n} i^3 =$ _____
5. $\sum_{i=1}^{n} (a_i \pm b_i) = \sum_{i=1}^{n} a_i \pm \sum_{i=1}^{n} b_i$
6. $\sum_{i=1}^{n} ka_i = k\sum_{i=1}^{n} a_i$

To find the limit of a summation, . . .

Example 1: Find the limit of $S(n)$ as $n \to \infty$.

$$S(n) = \sum_{i=1}^{n} \frac{i-5}{n^3}$$

II. The Area Problem (Pages 823–825)

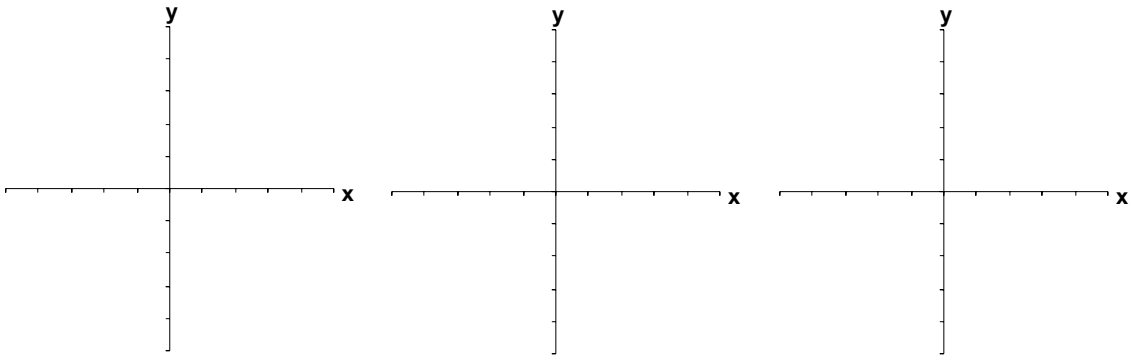
What you should learn
How to use rectangles to approximate areas of plane regions and to use limits of summations to find areas of plane regions

Describe the area problem.

The exact **area of a plane region *R*** is given by . . .

Let f be continuous and nonnegative on the interval $[a, b]$. The area A of the region bounded by the graph of f, the x-axis, and the vertical lines $x = a$ and $x = b$ is given by

Example 2: Find the area of the region bounded by the graph of $f(x) = (x - 4)^2 + 5$ and the x-axis between $x = 3$ and $x = 6$.



Homework Assignment

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